

Neural mechanisms of comfortable feeling induced by odors bringing back of memories

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Olfaction is a unique sensory modality in that it can strongly bring memories back and induce physiological and psychological responses. Odor sensation associated with old memories often accompanies comfortable feelings. However, neural mechanisms of such emotional responses are still unclear. We recently reported that odor-induced attractive behaviors accompanies activation of the olfactory tubercle (OT) in mice. The anteromedial domain of the mouse OT was activated by learned odor cues that induced approach behaviors. In addition, a larger number of dopamine receptor D1 type neurons were activated than D2 type neurons. In this study, we addressed whether the D1 type neurons in the anteromedial OT is involved in attractive behaviors induced by odor cues associated with environment where mice spent infant period. We at first confirmed that mice acquired attractive behaviors to odors associated with bedding where they spent infant periods. Activation of D1 type neurons in the anteromedial OT was observed when mice showed approaching behavior to the odor cue associated with the bedding. We confirmed that optogenetic activation of D1 type neurons in the anteromedial OT induced real-time place preference. These results raise a possibility that the D1 type neurons in the anteromedial OT can be activated by environmental odors which mice experienced in infants and plays a role in attractive behaviors.